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Characteristic differences between parents/guardians who keep immunization records and those who do not

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CHARACTERISTIC DIFFERENCES BETWEEN PARENTS/GUARDIANS WHO KEEP IMMUNIZATION RECORDS AND THOSE WHO DO NOT

A Thesis

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in

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by

Rebecca Bonilla Mangual

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ABSTRACT

Immunization records are an important aspect of a child's healthcare. The overuse or underuse of immunizations can pose serious risks to the health of a child. Health care providers cannot keep track of all previous immunizations given the current mobility of patients and their frequent changes of primary care providers.

The question posed is what are the characteristics of persons who do maintain or do not maintain immunization records for their children.

The relationship between producing an immunization record and the characteristics of those who keep immunization records has not been well documented. While the literature emphasizes the need for healthcare systems and providers to keep track of the immunization record, the literature only briefly mentions the role of the parent or guardian.

The intent of this thesis is to explore the characteristics of the parents or guardians who keep the immunization records and determine if there is something in these characteristics that tells us why they are or are not keeping immunization records.

This study uses the data set from the National Health Interview Survey (NHIS). The NHIS administers telephone interviews in a nationally representative random sample of U.S. households. Information is obtained about the health and other characteristics of each member of the household.

The 2000 National Health Interview Survey contained 38,633 households, with 100,618 persons in 39,264 families. The interview sample for the Sample Adult component, which required self-response to all questions, was 32,374 persons of 18 years of age and older.

The sampled responses were analyzed by whether the respondent could produce an immunization record for a child family member to determine any difference in age, sex, education, race, ethnicity, income, insurance, and relationship to the child.

The overall findings revealed a difference between those with privately purchased health insurance and health insurance paid by the government or employer. For individuals with privately purchased insurance, the percentage of participants with immunization records was 27%, while among those with government- or employer- paid insurance, 42% could produce a record representing a difference of 15%.

Mothers and fathers, who had an education level of 8^{th} grade or less, were more likely to produce the indicated shot records.

In conclusion, the data and analyses used to determine the characteristics of those who keep immunization records revealed only slight differences in all categories with the exception of private insurance paid by the government or employer. The implication of this is that more studies should be conducted to determine why are immunization records not kept.

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CHAPTER ONE

INTRODUCTION

Statement of Problem

Immunization records contain important information used to direct children's healthcare. Noted as part of the immunization record are the type of vaccine, the series number, dosage, and date of vaccination.

There are several reasons immunization records are important. The first is to prevent over-immunization. Without an immunization record, it is difficult to know which immunizations have been given to the child. Over-immunization contributes to escalating immunization cost.

Overuse of immunizations can also present a health risk. The Centers for Disease Control and Prevention (CDC) have noted that vaccines are not without risks. At the least, minor side effects as mild fever, and pain at the injection site can be experienced.

But health risk can be more serious. Jonathon Atchison was a six-year-old who was administered the varicella vaccination and, within a matter of days, fell into a coma and died. Jonathon had developed hemorrhagic varicella, a rare but life-threatening complication of the

virus. In another case, three-month old Harrison Slay was vaccinated against the rotavirus. He suffered a painful side effect in which his bowel folded into itself (Connolly, 2000). Because of such health risks to children, the U.S. Congress passed the Childhood Vaccine Injury Act in 1986, to compensate families for injury or death related to immunizations.

The second reason is to provide ongoing documentation when there is no continuity of care. Parents may change doctors frequently and physicians may leave the workforce. Vaccinations are available from multiple sources. The primary care physician, historically the best source of information, may not know which immunizations have been given if the parent does not have the immunization record.

The third reason immunization records are important is there is no current national system for tracking immunizations. Although HMO's have tried to keep track of immunization records through the use of claims payment sources, this data is often flawed because it is recorded after the child receives the immunization. Therefore, the most valid tracking of immunizations remains the responsibility of the parent or guardian.

Literature Review

This chapter describes literature relevant to the research purposes of this thesis. The need to investigate the characteristics of caregivers who do keep immunization records for children is important because (1) immunizations are our number one defense to prevent childhood disease; (2) immunization records help reduce the disparities in immunizations; (3) understanding these characteristics can support the development of systems for more accurate tracking, such as parent/guardian education, managed care organizations, school systems, etc.

Immunizations is our Number One Defense to Prevent Childhood Disease

Immunizations are our number one defense to prevent childhood disease. Adequate immunization protects children against several diseases that have killed or disabled many children in the past decades. If immunization differences occur in childhood and go unrecognized, treatment to prevent childhood illnesses can be devastating. Most of the established methods for giving immunizations are based primarily on the parent's ability to keep an accurate immunization record.

One way used to track vaccines given to children is by the immunization record. A child usually has two

sources of immunization history information, the parent and the health care provider (Stokley, 2001). With so many different types of immunizations given today it is imperative that accurate records be kept. This study is an attempt to determine what the characteristics are of the persons whose children have immunization records.

Recommendations for children's immunizations are reasonably well established by the American Academy of Pediatrics. The challenge is how to create systems in practice so that the process can be prioritized and implemented. Because immunization rates have historically served as a guide for the overall delivery of children's well-child care, it would stand to reason that we would have a better system in place to track immunizations (Clark, 2001).

Even though advances in technologies have made tracking easier they have also masked continuing deficiencies in the ways in which immunizations are delivered. With the measles outbreak in Chicago from 1989-1990, the health care community realized that immunization rates were actually highly variable and often low. The remarkable effectiveness of the technology they had in place had masked gaps in the delivery of services (Berman, 2002).

The continued success of vaccinations are being challenged by an immunization schedule that is increasing in size and complexity and, in Gellin's opinion, because of this there is a lack of accessible, unified immunization records. Already, children are recommended to receive a total of 15 to 19 vaccine doses by 18 months of age, compared with only eight doses 20 years ago. New vaccines will continue and perhaps accelerate this trend. The problem is that, by virtue of their absence, the diseases that vaccines prevent no longer serve as a reminder of the need for immunization (Gellin, 2000).

Immunization Schedule			
Birth:	Hep B	12-15 months:	Hib, MMR, PCV
1-4 months:	Hep B	12-18 months:	Var
2 months:	DTaP, Hib, IPV, PCV[5]	15-18 months:	DTaP
4 months:	DTaP, Hib, IPV, PCV	4-6 years:	DTaP, MMR, IPV
6 months:	DTaP, Hib, PCV	11-12 years:	Td
6-18 months:	Hep B, IPV		

Figure 1. Immunization Schedule

In 2000, the US had the lowest rates of vaccine-preventable diseases and the highest rates of immunizations ever recorded. Although routine pediatric immunization programs have eradicated many of the infectious diseases of childhood and have been one of the most remarkable public health accomplishments, some challenge these achievements (National, 2000). To continue this remarkable achievement at least two things are necessary. First, all unimmunized children must be identified and immunized. Second, there needs to be ongoing, accurate and complete data on immunizations. The challenges come from the inability to have accurate data in regards to keeping accurate immunization records.

Immunization Records Help Reduce the Disparities in Immunizations

One of the ways used to track when and how many immunizations children receive is the immunization record. Because parental records of a child's immunization history have been shown to be unreliable, and because health care professionals are required by law to record information about immunizations given in their offices, the health care provider's records are typically viewed as being the most accurate. Recent studies have shown that many children are vaccinated away from the primary care office,

either at a previous provider office or at the health department. New patients may not bring adequate documentation of their immunization history to their initial visit to a new primary care provider. Communication between immunization providers and patients may be poor. This leads to a lack of unified records at the primary care provider's office and an inability to determine vaccination needs accurately (Stokley, 2001).

Rates of immunizations between different socioeconomic groups are a public policy concern. Children of minority race and ethnicity tend to be less likely to receive a prescribed medication for a specific condition and to receive fewer overall prescribed medications (Hahn, 1995). A lack of education on the part of the caregiver or parent seems to be the cause for the decrease in immunizations for children in low socioeconomic status. Because of these concerns we have gaps that exist and threaten the health and well-being of children as much as they do adults in need of health care services. According to the Institute of Medicine some parents create these gaps of overuse, underuse, and misuse (Berman, 2002), when they lose immunization records.

The information of the immunization record is important because it can be used as one of the

measurements to track the proper administration of vaccine series. It was noted by the Centers for Disease Control (CDC) that immunization records of children with family incomes below the poverty level were less likely to have received the combined series than children with family incomes at or above the poverty line-69 percent compared to 80 percent in 1996 (Santoli et al., 2000).

There is a current movement underway to make immunization record keeping more accurate. By doing so more children will get vaccinated and electronic safeguards will keep data confidential, according to Claire Broome, the acting director of the Centers for Disease Control and Prevention in Atlanta, Georgia. Ms. Broome goes on to say, "because we do not have a system designed to ensure all children have equal access to age-appropriate vaccinations we have caused an epidemic. Children are averaging approximately 12 different vaccinations before the age of two, and it is very hard to keep track of the number, series and dosage given to a child. Most parents (and even some physicians) can't keep up with the ever-changing recommendations to include new disease-preventing vaccines that make up the routine vaccination schedule for children in the United States" (Broome, 1998).

Understanding These Characteristics can Support the Development of Systems for more Accurate Tracking, Such as Parent/Guardian Education, Managed Care Organizations, School Systems, etc

Managed care programs for the Medicaid population serve populations of lower socioeconomic status. Concerns exist whether HMOs can successfully meet the special needs of Medicaid beneficiaries. Medicaid beneficiaries come from the traditional fee-for-service system that encourages the use of medical services whenever felt necessary. Cunningham and Trude (2001) believe that Medicaid beneficiaries also experience difficulty with access to care and often received services from providers who were thought to be of lower quality, and possibly didn't think to give immunizations within the recommended guidelines set by the state.

The Medicaid population is inherently vulnerable and often presents challenges including illiteracy, inadequate social supports, and alternative conceptions of illness that are foreign to many health plans. Moreover, Medicaid beneficiaries generally are unfamiliar with the managed care settings and may have difficulty negotiating complex bureaucratic impediments (Cunningham & Trude, 2001).

Alessandrini states that when looking at the effects that managed care is having on children's immunizations,

it appears to be having a positive affect on lowering the disparities among children who are considered to be of low income. She goes on to say that Medicaid plays a critical role in providing health coverage for low-income children in the United States (Alessandrini, 2001).

Alessandri performed a study of Medicaid enrolled infants for the first 24 months of life to determine if enrollment in Medicaid managed care affected quality of care as measured by immunization rates and selected screening tests when compared with infants receiving fee-for-service Medicaid (FFSM). What she found was that although type of Medicaid insurance did not seem to be related, multiple other factors had been associated with inadequate childhood immunization status. These factors include higher birth order, younger maternal age, less formal maternal education, maternal single marital status, lack of an identified primary care provider, and not living with a grandmother (Alessandrini, 2001).

In 1996, Medicaid paid for 4 of 10 births in the United States, and 21.3 million children--nearly one quarter of all US children--were enrolled in Medicaid for health care services (Morrow, 2000). Literature examined demonstrates the effectiveness of having insurance and the importance of Medicaid in expanding health care for

low-income children. There is considerably less evidence to assess how the shift to managed care arrangements under Medicaid has influenced health care for poor children (Cunningham & Trude, 2001).

Immunization rates are valid and reliable markers of quality pediatric care. The rate of immunization is where coordinated care through a managed care plan could have a significant effect. LeBaron and colleagues found that under-immunization was a powerful, independent marker for inadequate health supervision in an impoverished population (LeBaron et al., 2002).

Research has not shown that Medicaid managed care (MMC) programs have made a demonstrable improvement in the share of children being immunized. A 1985 evaluation of California and Missouri managed care programs found that immunization rates for children in MMC were comparable to those in fee-for-service arrangements and that the rates for children in both groups were low (Carey, Weis, & Homer, 1990). A study of families in Los Angeles in 1992 again showed no difference in immunization status at 24 months of age between MMC and fee-for-service patients. Wood et al., found, however, that low-income children enrolled in managed care had lower immunization rates than children in other arrangements (Wood et al., 1995).

There are many barriers for children to have vaccinations. Some children of low socioeconomic status lack health insurance and some children's insurance plans do not cover vaccinations. In order to close the gap between minority and non-minority children, there must be a genuine improvement in vaccine delivery. A study conducted by the Joyce Foundation of Chicago mentioned possible barriers to immunization to include economic status, clinic services, record keeping, and parent and provider education (2002 Policy Brief: Prevention Challenge).

The issue of economic barriers to vaccination led to the development of the federal Vaccines for Children (VFC) program. Instituted in October 1994, the VFC provides states with free vaccines for children who are Medicaid-eligible, have no health insurance, or are Native Americans or Alaskan natives (LeBaron et al., 2002). Children whose insurance does not cover vaccines are eligible for VFC if they are vaccinated at a federally qualified health center or rural health clinic (Zimmerman, 2001).

The VFC program distributes vaccines through 61 immunization projects to both private providers and public clinics costing about $560 million annually. That figure

is expected to increase as new vaccines are added (CDC). For example, as of September 27, 2000, the prices for Haemophilus influenza type b vaccines were $5.20 to $7.75 per dose under the federal contract and $15.25 to $18.12 in the private sector, compared with the newer 7-valent pneumococcal conjugate vaccine at $44.25 per dose under the federal contract and $58.00 in the private sector (CDC).

A recent evaluation of the VFC penetration rate has reported that 74% of the surveyed population received all or some of their immunizations from a VFC-enrolled provider (Santoli, Rodewald, Maaes, Battaglia, & Coronado, 1999).

Although the VFC marked a major change in vaccine financing, there was some who challenged cost as an impediment to immunization. The General Accounting Office, in a 1995 report to the United States Congress on the VFC, wrote that the "cost for at least some major vaccines has not been a major barrier to immunization" (Vaccinations for Children, 1999, p. 5).

CHAPTER TWO

METHOD

Overview of Design

Sources of Data

The data source used was the 2000 National Health Interview Survey. The National Health Interview Survey (NHIS) is a multi-purpose survey conducted by the National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention (CDC), and is the principal source of information on the health of the civilian, non-institutionalized, household population of the United States. The (NHIS) has been conducted annually since its inception in 1957.

Participants

Registration of participants in the study was done by the 2000 National Health Interview Survey (NHIS). The interviewed sample for 2000 consisted of 38,633 households (100,618 persons in 39,264 families). The interview sample for the Sample Adult component, which required self-response to all questions, was 32,374 persons 18 years or age and older. The interviewed sample for the Sample Child component, by proxy response from a knowledgeable adult in the family, was 13,376 children

0-17 years old. Lastly, the interviewed sample for the Immunization section, again by proxy response from a knowledgeable adult in the family, was 14,618 children aged 17 and younger (NHIS, 2002).

Content of the National Health Interview Survey Household Questionnaire

The U.S. Bureau of the Census conducts NHIS data collection under an interagency agreement with NCHS. NHIS interviewers are employees of the U.S. Bureau of the Census. These interviewers receive extensive training, and their work is monitored through a quality assurance program. Data is collected from each family in the survey sample using telephone interviews. If a sampled household contains more than one family, many aspects of the interview are repeated for each family in the household (Botman & Christopher, 2002).

The basic module contains three components: the family core, the sample adult core, and the sample child core. The family core component collects information on everyone in the family. Information collected in the family core component includes household composition and socio-demographic characteristics. It also includes basic indicators of health status and utilization of health care services. From each family in the survey, one sample adult

and one sample child (if any children under age 18 are present) are randomly selected, and information on each is collected with the sample adult core and the sample child core questionnaires (Botman & Christopher, 2002).

Sample Design

The NHIS is conducted annually by the National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention (CDC). The 2000 NHIS was broken into seven questionnaires - Household, Family, Sample Adult, Sample Child, Immunization, Recontact, and Cancer Control.

Each week a probability sample of the civilian non-institutionalized population of the United States was interviewed by personnel of the U.S. Bureau of the Census. Information was obtained about the health and other characteristics of each member of the household.

The Survey is based on a stratified multistage sample design. The specific parameters of the design, however, have changed over time; a new sample design is implemented following each decennial census. For example, the 1973-84 survey design had 386 sample primary sampling units (PSU's), the 1985-94 survey design had 198 sample PSU's, and the current 1995-2004 survey design has 358 sample PSU's. The 1995-2004 NHIS has been designed to produce estimates for the Nation, for each of the four census

regions, and within census regions by areas determined by metropolitan and non-metropolitan status. Although the 1995-2004 survey samples from all of the States and the District of Columbia, it is not designed to produce reliable state-level estimates for every state (Botman & Christopher, 2002).

The immunization data file and person data file were merged on the basis of household number, family number, and person number. In all analyses, the merged data were weighted by the final full-year sample weight. This provided percentages that are more accurate reflections of actual population percentages.

Not all data in the NHIS questionnaire were used in this study. The raw data were calculated and analyzed in percentages by using SPSS statistical software program. Each variable was compared between having immunization (shot) record and not having shot records. Some variables can be compared with each other, such as mother's and father's relationship, education level, and parents present in a family. The following variables were analyzed:

1. Gender of children:
2. Age of children. There were two categories - under 5 years of age and between 5 and 17 years of age.
3. Type of family: This represents parents present in the home. It consisted of four categories- mother-no father, father-no mother, both mother and father, and neither mother and father present.
4. Parent relationship: This represents the relationship among mother, father, and a child. There were four data categories- biological, step, adoptive, and foster mother and father.
5. Parent's educational level: This showed level of education of each parent. It contained eight categories- less or equal to 8^{th} grade, 9^{th}-12^{th} grade, high school diploma/GED, some college but no degree, Associate degree (technical and vocational), Associate degree (academic program), Bachelor's degree, and Master's degree or higher.
6. Family size: This represented number of persons in a family. It contained 16 categories ranging from a family size of 2 to 21.

7. Family income: This compared two categories between family income below and above $20,000. Family income below $20,000 indicated poverty level or low socioeconomic status.
8. Race and ethnicity: White, African American, Indian and Alaska Native, Asian Indian, Chinese, Filipino, and other Asians were analyzed. Hispanic ethnicity was also used for analysis and compared with other ethnicities.
9. Health insurance: This represented insurance status for health services for the child. It contained 6 categories- private health insurance purchased directly, private health insurance purchased through government or community, under Medicaid program, children's health insurance (CHIP), state-sponsored health plan, and no health insurance.
10. Primary care physician: This indicated 2 categories between children with and without continuity of care with their primary care physician.

CHAPTER THREE

ANALYSIS AND RESULTS

Data Analysis

The research was guided by the question: what are the characteristic differences between persons who keep immunization records for their children and those who do not. The data was analyzed using cross tabulation analysis. Different variables were used to compare the characteristics of persons having immunization records with those who did not.

In the literature review many opinions are given regarding the importance of the immunization record and the need to have a standardized system to track immunizations. The literature also discusses the two most important sources of immunization data: the parent or guardian and the physician. Most of the literature cites the physician as a reliable source of documentation, while very little is mentioned about the parent or guardian, and no information or data is available to determine the characteristics of the parent who does maintain immunization records.

Univariate analysis was used to determine the distribution of results. Demographic factors including

gender, parents present in the family, type of relationship between parents and a child, parents' educational levels, family size, family income, ethnicity, race, health insurance, and primary physician were reported.

Bivariate analyses were performed using cross-tabulations. The analysis determined comparison between having immunizations (shots) records and no records.

Table 1. Cross-tabulation of Sex by Having Shot Records

Crosstab

			Have shot records		
			Yes	No	Total
Sex	Male	Count	9365312	27601502	36966814
		% within Sex	25.3%	74.7%	100.0%
	Female	Count	9391000	25923458	35314458
		% within Sex	26.6%	73.4%	100.0%
Total		Count	18756312	53524960	72281272
		% within Sex	25.9%	74.1%	100.0%

The data gathered revealed that almost two-third of children did not have immunization records. There was no difference in gender of children. Females and males, both were approximately equally likely to have an immunization record produced for them. The percentages of male and female children who did not have immunization records were 74.7% and 73.4%.

Table 2. Cross-tabulation of Children Age by Having Shot Records

Crosstab

			Have shot records		
			Yes	No	Total
Age Recode #1	Under 5 years	Count	6878276	12697305	19575581
		% within Age Recode #1	35.1%	64.9%	100.0%
	5-17 years	Count	11878036	40827655	52705691
		% within Age Recode #1	22.5%	77.5%	100.0%
Total		Count	18756312	53524960	72281272
		% within Age Recode #1	25.9%	74.1%	100.0%

The data also revealed that children under five years old were more likely to have immunization records (35.1%) than those between 5 and 17 years of age (22.5%).

Table 3. Cross-tabulation of Parents Present in the Family by Having Shot Record

Crosstab

			Have shot records		
			Yes	No	Total
Parent(s) present in the family	Mother, no father	Count	3587772	12226051	15813823
		% within Parent(s) present in the family	22.7%	77.3%	100.0%
	Father, no mother	Count	339201	1749537	2088738
		% within Parent(s) present in the family	16.2%	83.8%	100.0%
	Mother and father	Count	14553940	37805374	52359314
		% within Parent(s) present in the family	27.8%	72.2%	100.0%
	Neither mother nor father	Count	273818	1743998	2017816
		% within Parent(s) present in the family	13.6%	86.4%	100.0%
Total		Count	18754731	53524960	72279691
		% within Parent(s) present in the family	25.9%	74.1%	100.0%

A higher percentage of the children who had immunization records produced for them were in two parent families (27.8%) or in families with at least the mother present (22.7%). The data indicated that although most children did not have immunization records (74%), those who did were more likely to have a shot record from 2 parent families.

Table 4. Cross-tabulation of Type of Relationship with Mother by Shot Record

Crosstab

			Have shot records		
			Yes	No	Total
Type of relationship with Mother	Biological	Count	17482298	47763459	65245757
		% within Type of relationship with Mother	26.8%	73.2%	100.0%
	Step	Count	295630	794934	1090564
		% within Type of relationship with Mother	27.1%	72.9%	100.0%
	Adoptive	Count	106137	978301	1084438
		% within Type of relationship with Mother	9.8%	90.2%	100.0%
	Foster	Count	74182	222442	296624
		% within Type of relationship with Mother	25.0%	75.0%	100.0%
Total		Count	17958247	49759136	67717383
		% within Type of relationship with Mother	26.5%	73.5%	100.0%

The previous table (Table 3) showed a higher percentage of children in two parent families (27.8%) or in families with at least the mother present (22.7%) had immunization records produced for them. Table four shows the importance

of the familial role of mothers. As reported in the literature review, this is consistent with other studies reporting the knowledge and importance of the female member of the family about the health of other members of the family. Among families where at least a mother figure is present, those children who were adopted were least likely to have an immunization record produced for them (9.8%). The low percentage would suggest that there is generally, a low level of immunization documentation available for adopted children. Children of biological, step and foster mothers were approximately equally likely to have an immunization record produced for them (biological+27%, step+27%; and foster+27%.)

Table 5. Cross-tabulation of Type of Relationship with Father by Shot Record

Crosstab

			Have shot records		
			Yes	No	Total
Type of relationship with Father	Biological	Count	13445669	35041955	48487624
		% within Type of relationship with Father	27.7%	72.3%	100.0%
	Step	Count	298961	937475	1236436
		% within Type of relationship with Father	24.2%	75.8%	100.0%
	Adoptive	Count	940677	3147286	4087963
		% within Type of relationship with Father	23.0%	77.0%	100.0%
	Foster	Count	96604	172590	269194
		% within Type of relationship with Father	35.9%	64.1%	100.0%
Total		Count	14781911	39299306	54081217
		% within Type of relationship with Father	27.3%	72.7%	100.0%

In table 5 among families where at least the father was present, foster children were more likely to have an immunization record produced for them (35.9%). Children of biological, step and adoptive fathers were approximately equally likely to have an immunization record produced for them (biological+27%, step+24%; and adoptive+23%).

Table 6. Cross-tabulation of Education of Mother by Shot Record

Crosstab

			Have shot records		
			Yes	No	Total
Education of Mother	Less/equal to 8th grade	Count	1246938	2416819	3663757
		% within Education of Mother	34.0%	66.0%	100.0%
	9-12th grade, no high school diploma	Count	2180541	5923248	8103789
		% within Education of Mother	26.9%	73.1%	100.0%
	High school graduate/GED recipient	Count	4484724	14485412	18970136
		% within Education of Mother	23.6%	76.4%	100.0%
	Some college, no degree	Count	3572423	9791488	13363911
		% within Education of Mother	26.7%	73.3%	100.0%
	AA degree, technical or vocational	Count	1387890	3333666	4721556
		% within Education of Mother	29.4%	70.6%	100.0%
	AA degree, academic program	Count	764761	2075260	2840021
		% within Education of Mother	26.9%	73.1%	100.0%
	Bachelor's degree	Count	3255190	8068620	11323810
		% within Education of Mother	28.7%	71.3%	100.0%
	Master's, professional, or doctoral degree	Count	1186093	3429069	4615162
		% within Education of Mother	25.7%	74.3%	100.0%
Total		Count	18078560	49523582	67602142
		% within Education of Mother	26.7%	73.3%	100.0%

Educational level of the mother shows no large percentage differences in the dependent variable except in the case of mothers who had an education level of 8^{th} grade or less.

Table 7. Cross-tabulation of Education of Father by Shot Record

Crosstab

			Have shot records		
			Yes	No	Total
Education of Father	Less/equal to 8th grade	Count	1003840	2054043	3057883
		% within Education of Father	32.8%	67.2%	100.0%
	9-12th grade, no high school diploma	Count	1412988	3602830	5015818
		% within Education of Father	28.2%	71.8%	100.0%
	High school graduate/GED recipient	Count	4035394	11618383	15653777
		% within Education of Father	25.8%	74.2%	100.0%
	Some college, no degree	Count	2788796	6428129	9216925
		% within Education of Father	30.3%	69.7%	100.0%
	AA degree, technical or vocational	Count	956071	2842402	3798473
		% within Education of Father	25.2%	74.8%	100.0%
	AA degree, academic program	Count	442038	1151943	1593981
		% within Education of Father	27.7%	72.3%	100.0%
	Bachelor's degree	Count	2613218	7108542	9721760
		% within Education of Father	26.9%	73.1%	100.0%
	Master's, professional, or doctoral degree	Count	1555944	4210060	5766004
		% within Education of Father	27.0%	73.0%	100.0%
Total		Count	14808289	39016332	53824621
		% within Education of Father	27.5%	72.5%	100.0%

While the previous table (Table 6) showed educational level is relatively unimportant except in the case of mothers who had an educational level of 8th grade or less, Table 7 showed that among fathers, those fathers who had less then an 8^{th} grade education level (32.8%); or some college, no degree (30.3%); were more likely to produce a

immunization record. Children of fathers of higher levels of education were approximately equally likely to not have an immunization record produced for them; 9-12th grade, no high school diploma +28%, High school grad/GED +25%; AA degree, technical or vocational +25%; AA degree, academic program + 27%; Bachelor's degree 26% and Master's, professional, or doctoral degree +27%. The data in this table as well as (Table 6) show that among both parents they were more likely to produce a immunization record if the have a educational level less or equal to 8th grade (33.4%).

Table 8. Cross-tabulation of Number of Persons in Family by Shot Record

Crosstab

			Have shot records		
			Yes	No	Total
Number of persons in family	2	Count	759707	2392173	3151880
		% within Number of persons in family	24.1%	75.9%	100.0%
	3	Count	3342794	10357918	13700712
		% within Number of persons in family	24.4%	75.6%	100.0%
	4	Count	7105936	18908132	26014068
		% within Number of persons in family	27.3%	72.7%	100.0%
	5	Count	4138812	12166231	16305043
		% within Number of persons in family	25.4%	74.6%	100.0%
	6	Count	1927160	5238837	7165997
		% within Number of persons in family	26.9%	73.1%	100.0%
	7	Count	709399	2189323	2898722
		% within Number of persons in family	24.5%	75.5%	100.0%
	8	Count	432777	1139113	1571890
		% within Number of persons in family	27.5%	72.5%	100.0%
	9	Count	204905	537572	742477
		% within Number of persons in family	27.6%	72.4%	100.0%
	10	Count	59276	299777	359053
		% within Number of persons in family	16.5%	83.5%	100.0%
	11	Count	39356	110836	150192
		% within Number of persons in family	26.2%	73.8%	100.0%
	12	Count	1555	23456	25011
		% within Number of persons in family	6.2%	93.8%	100.0%
	13	Count	19439	39298	58737
		% within Number of persons in family	33.1%	66.9%	100.0%
	14	Count	13162	90399	103561
		% within Number of persons in family	12.7%	87.3%	100.0%
	16	Count		13922	13922
		% within Number of persons in family		100.0%	100.0%
	18	Count	2034	7021	9055
		% within Number of persons in family	22.5%	77.5%	100.0%
	21	Count		10952	10952
		% within Number of persons in family		100.0%	100.0%
Total		Count	18756312	53524960	72281272
		% within Number of persons in family	25.9%	74.1%	100.0%

The data in the table above shows that family size reflected no differences in immunization record percentages.

Table 9. Cross-tabulation of Family Income at/below $20,000 by Shot Record

Crosstab

			Have shot records		
			Yes	No	Total
Fam inc at/above vs. below $20,000	$20,000 or more	Count	14849869	41033299	55883168
		% within Fam inc at/above vs. below $20,000	26.6%	73.4%	100.0%
	Less than $20,000	Count	3395168	9699467	13094635
		% within Fam inc at/above vs. below $20,000	25.9%	74.1%	100.0%
Total		Count	18245037	50732766	68977803
		% within Fam inc at/above vs. below $20,000	26.5%	73.5%	100.0%

Family income above or below $20,000 does not differentiate producing an immunization record or not. This is consistent with other studies reporting the importance of the family income level. The data showed that among families with incomes of less then or more then $20,000 children were approximately equally likely to have an immunization record produced for them ($20,000 or more +26%, and less the $20,000+25%).

Table 10. Cross-tabulation Race Coded to Single Race Group Having Shot Records

Crosstab

			Have shot records		
			Yes	No	Total
Race coded to a single race group	White	Count	14182305	40063009	54245314
		% within Race coded to a single race group	26.1%	73.9%	100.0%
	Black/African American	Count	2307024	8677683	10984707
		% within Race coded to a single race group	21.0%	79.0%	100.0%
	Indian (American), Alaska Native	Count	187651	586771	774422
		% within Race coded to a single race group	24.2%	75.8%	100.0%
	Asian Indian	Count	121809	328102	449911
		% within Race coded to a single race group	27.1%	72.9%	100.0%
	Chinese	Count	118810	317262	436072
		% within Race coded to a single race group	27.2%	72.8%	100.0%
	Filipino	Count	165049	328053	493102
		% within Race coded to a single race group	33.5%	66.5%	100.0%
	Other Asian*	Count	355018	852052	1207070
		% within Race coded to a single race group	29.4%	70.6%	100.0%
	Other Race*	Count	1192685	2038973	3231658
		% within Race coded to a single race group	36.9%	63.1%	100.0%
	Multiple Race*	Count	125961	333055	459016
		% within Race coded to a single race group	27.4%	72.6%	100.0%
Total		Count	18756312	53524960	72281272
		% within Race coded to a single race group	25.9%	74.1%	100.0%

The data in the table show that Black /African American children were least likely to have an immunization record produced for them (21%). Children of Filipino and Other race were approximately equally likely to have an

immunization record produced for them (Filipino+33%, and Other+36%). Children of single race codes were approximately equally likely to have an immunization record produced for them (white+26%, Indian+24%; Asian Indian+27;Chinese+27;Other Asian+29 and Multiple Race+27%). The Filipino group did better than other groups - mixed race or other.

Table 11. Cross-tabulation of Combined Race/Ethnicity Recode Having Shot Records

Crosstab

			Have shot records		
			Yes	No	Total
Combined race/ethnicity recode	Hispanic	Count	3734800	8065683	11800483
		% within Combined race/ethnicity recode	31.6%	68.4%	100.0%
	Non-Hispanic White	Count	11714610	34241356	45955966
		% within Combined race/ethnicity recode	25.5%	74.5%	100.0%
	Non-Hispanic Black	Count	2302737	8541735	10844472
		% within Combined race/ethnicity recode	21.2%	78.8%	100.0%
	Non-Hispanic Other	Count	1004165	2676186	3680351
		% within Combined race/ethnicity recode	27.3%	72.7%	100.0%
Total		Count	18756312	53524960	72281272
		% within Combined race/ethnicity recode	25.9%	74.1%	100.0%

Those children who were Hispanic were more likely to have an immunization record produced for them (31.6%). Non-Hispanic White, Non-Hispanic black and non-Hispanic other children were approximately equally likely to have

an immunization record produced for them (Non-Hispanic white+25%, non-Hispanic blak+21%; and non-Hispanic other+27%).

Table 12. Cross-tabulation of Insurance Status and Coverage of Children Having Shot Records

Insurance Status of Child	Have Shot Records			
	Yes	No	Total	N
Private health insurance purchased directly	23.5%	6.5%	100.0%	2,742,289
Private health insurance through gov/com.	42.0%	8.0%	100.0%	66,764
Medicaid	27.9%	2.1%	100.0%	10,762,358
Children's Health Insurance	26.7%	3.3%	100.0%	899.208
State-sponsored Health Plan	27.5%	2.5%	100.0%	2,018,779
No Health Insurance	27.1%	2.9%	100.0%	7,807,060
Signed up with HMO?	27.1%	2.9%	100.0%	54,679

The data in table 12 shows that for families who purchased private health insurance directly, children were least likely to have an immunization record produced for them (76.5%). For families where private health insurance is through the government or community, children were most likely to have an immunization record produced for them (42%). Children who had Medicaid were equally likely to have an immunization record produced for them (72.1%) as children with no health insurance. As reported in the

literature review, this is consistent with other studies reporting the knowledge and importance of services offered through programs by the family about the programs offered to families. Children receiving benefits under the Children's Health Insurance Program were least likely to have an immunization record produced for them (73.3%). The data in the table shows that among families where no health insurance was present, those children were least likely to have an immunization record produced for them (72.9%). Children signed up with an HMO, were less likely to have an immunization record produced for them (72.9%) then children not in an HMO.

Table 13. Cross-tabulation of Primary Care Physician for Routine Care Having Shot Records

Crosstab

			Have shot records		
			Yes	No	Total
Primary care physician for routine care	Yes	Count	1699083	4460318	6159401
		% within Primary care physician for routine care	27.6%	72.4%	100.0%
	No	Count	1247754	3140418	4388172
		% within Primary care physician for routine care	28.4%	71.6%	100.0%
Total		Count	2946837	7600736	10547573
		% within Primary care physician for routine care	27.9%	72.1%	100.0%

Having a primary care physician for routine care results in only 1 percentage point higher rate of producing a shot

record than does not having a primary care physician. Of those who report not having insurance 27.6% had immunization records as compared to 72.4% who did not. As reported in the literature review, this is consistent with other studies reporting that many children were vaccinated away from the primary care office, either at a previous provider office or at the health department.

CHAPTER FOUR

DISCUSSION

The purpose of this study was to determine what characteristics were associated with parents/ guardians who maintained their children's immunization records or those who did not. The findings indicated that the majority (approximately 70%) of parents/guardians did not keep immunization records. There were no significant differences in the gender of children who had the records, family income, and primary care physicians. However, the results also revealed that there was slight significance related to the child's age, type of parents, and parent's relationship with the child, education, family size, ethnicities, and health insurance. Children less than 5 years old, children living with both mother and father or biological parents with the educational level of the eighth grade or lower, Asian parents, and parents with private health insurance through government or community were most likely to maintain immunization records.

It was surprising to discover that the majority of children did not have immunization records. Both the public and private healthcare strongly support and provide

immunizations, which are necessary for children to have before getting into school.

As a child gets older, fewer immunization records were kept for these children. Older children have fewer required immunizations than younger children, especially those under 5 years of age. The results revealed that children under 5 were still more likely to have the records. This was very important because children in this age group were especially susceptible to fighting infectious diseases because of their lower immune system (NIP, 2002).

Parents may not have had an immunization record if they adopted a child. This could have been because an adoption agency did not provide them the documents or they could not receive all information about the child prior to the adoption, this is especially true when a child is adopted from a developing country.

Parents' with higher educational levels did not keep immunization records better than those with a lower education level. This might be due to the fact that those with a higher educational level did not have time to pay attention to details because of their busy lifestyles. Hence, parents with lower educational levels may have more time to take care of their children and have less

questioning of healthcare providers, therefore following suggestions or instructions as opposed to those with a higher educational level.

It was interesting that families with more members were more likely to keep the immunization records than those with fewer family members in the household. This could be because some mature adults, such as grandparents, relatives, or others were in the same household helping to take care of the children in the household.

The data obviously showed that parents with health insurance purchased directly from government or community were most likely to keep immunization records. This could be attributed to the fact that they receive free or less costly services.

The federal program Vaccines for Children (VFC) provides free immunizations to eligible children, including insurance coverage for all those who were enrolled in Medicaid, American Indians, and Alaskan Natives. The results supported that because those poor children under the federal program have free immunizations, they were more likely to have records than those whose parents had to buy immunizations or private health insurance.

CHAPTER FIVE

LIMITATIONS OF THE STUDY

This study used the secondary data from the 2000 National Health Interview Survey (NHIS). Even though the NHIS survey has been conducted annually, only the most updated data for the year of 2000 could be used. During this time, some characteristics or data of parents/ guardians who keep and do not keep immunization records might have altered due to environmental changes. Furthermore, some characteristics of parents/ guardians in each state may be different, so one might not be able to conclude that results were useful in the local area or specific state, such as California.

Suggestions for Future Research

Future researchers may want to adapt and conduct their own survey in order to use primary data compared with the nationwide results. Other characteristics should be included, such as religion, culture, and access to care. Finally, researchers could also look for the reasons why parents/ guardians did not keep immunization records in order to see specific problems and receive better solutions.

Recommendations

1. Parents/guardians: Parents/ guardians should also be responsible for keeping immunization records for their children. They should be educated to understand and know how it is important to have the records to prevent under-use and over-use of immunizations. From this study, every parent should be informed about the importance of immunization records, but the following groups listed below should be targeted because through the research they were least likely to keep the records:
    - Guardians who do not have relation to a child
    - Single father
    - Adoptive parents
    - Parents with higher education
    - Black/African American parents
    - Parents who purchased private health insurance directly
2. Schools: School nurses may help parents to understand the importance of having their children's immunizations records. Nurses can

also explain to parents about outcomes when immunizations are underused and overused. Older children may also be taught to remind their parents to keep the records for them or keep immunization records themselves as well as other important documents.

3. Healthcare providers: Even though healthcare providers, such as nurses, nurse practitioner and physicians should keep the records in their offices, clinics, or hospitals, they also should explain to parents every time when they bring their children to have immunizations the necessity of keeping their own records in case of relocations, new insurance coverage, or other reasons that may not allow them to maintain the same healthcare provider. Healthcare providers should also provide the record when a child has had his/ her first immunization and always update the record at each immunization visit. Moreover, they should inform parents to always bring the records to prevent duplication and multiple records.
4. Government: It should be mandatory for healthcare providers to submit the reports of

giving immunizations to the government and transmit data of the records through the computer. Therefore, healthcare providers can receive information regarding immunizations from an accurate network from the government and have the ability to check the information and record of each child from the same resource.

CHAPTER SIX

CONCLUSION

Although immunizations are very important to prevent several serious diseases, underuse and overuse of immunizations can present dangers to users, especially to children. Immunization records, therefore, are a vital document to keep track of the quantity of each required immunization. The Immunization schedule is used to remind parents when and what immunization should be given. Parents/ guardians should not rely on healthcare providers to maintain the records, but also they should be responsible for keeping immunization records for their own children. All responsible public and private healthcare sections including schools, healthcare providers, organizations and government should work together to provide more education about the importance of immunization records to parents in order to improve quality services and healthcare delivery system.

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